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ZOOLOGY.—*Notes on the Crustacea, chiefly Natantia, collected by Captain Robert A. Bartlett in Arctic Seas.*<sup>1</sup> MARGARET E. VAN WINKLE, Wellesley College, and WALDO L. SCHMITT, U. S. National Museum.

Nearly every year for more than a decade Captain Bartlett has brought back a veritable zoological treasure trove to the United States National Museum. Some portions of his extensive collections have been reported upon by various specialists in this Journal, in the Proceedings of the National Museum, and in the Smithsonian Miscellaneous Collections. Here for the first time, however, is assembled a complete list of his decapod crustacea, together with some casual notes on a few other forms. The specimens listed were taken in each of the years 1924 to 1935, inclusive, with the exception of 1928 and 1934, when Captain Bartlett and his schooner, the *Morrissey*, were under exclusive contract to other parties.

Of particular interest are the collections made in Fox Channel, Fox Basin, and the Straits of Fury and Hecla north of the Melville Peninsula. The only decapod crustacea previously recorded from these waters were five in number, secured by the second Parry Expedition in the *Fury* and *Hecla*, for which the Straits were named, in the fall of 1822. These species were taken in nets off Igloodlik

<sup>1</sup> Received April 2, 1936.

Island, the winter quarters of that year, where they were said to have been "found abundantly," or "taken in considerable numbers." These particular decapods are *Spirontocaris groenlandica*, *S. polaris*, *S. spinus*, *Sabinea septemcarinata*, and *Sclerocrangon boreas*.<sup>2</sup>

Captain Bartlett also obtained the same species at several stations in the same general neighborhood, with the exception of *Sabinea septemcarinata*. Indeed, two of the species, *Spirontocaris groenlandica* and *S. spina*, were caught in the entrance of the Straits at a point a little farther north than Igloolik Island, together with two other decapods not seen by the earlier expedition: *Spirontocaris phippisii* and *S. gaimardii*. *S. gaimardii belcheri* and *S. fabricii*, which were dredged by Captain Bartlett at several stations, had also been missed by the Parry Expedition, as had *Pagurus krøyeri*, which Captain Bartlett collected off Igloolik Island.

The bulk of the decapod material of the 1929, 1930, and 1931 expeditions, amounting to over a thousand specimens, was determined by Mrs. Van Winkle, of the Department of Zoology of Wellesley College. The second author undertook the balance of the material not otherwise credited. We are indebted to Dr. Mary J. Rathbun for naming the several species of brachyura, while the identifications of the amphipods cited in connection with the crustacea found in seal and codfish stomachs were furnished by Clarence R. Shoemaker, whose complete report upon the amphipods is reserved for a later date.

In order to add to our knowledge of the distribution of the species discussed in this paper, brief reference has also been made to crustaceans that were named for the Biological Board of Canada and which had been secured under its auspices during a series of biological and fisheries surveys carried on in Hudson Strait and Hudson Bay in the years 1927, 1928, and 1930.

For conciseness, the localities from which the Bartlett crustacea listed below were collected are referred to by number in the manner suggested by Austin H. Clark in his report upon the Bartlett echinoderms (this Journal 26: 294). For more ready reference, these lo-

<sup>2</sup> ROSS, JAMES CLARK. *Marine Invertebrate Animals*, in Appendix, Jour. . . . Third Voyage . . . Discovery . . . Northwest Passage . . . , p. 120, London, 1826; and in Appendix, Narrative . . . Second Voyage . . . Search . . . Northwest Passage . . . , pp. lxxxii-lxxxiv, London, 1835.

Nils von Hofsten, in his masterly treatment of the crustacea of Eisfjord, Spitzbergen (Kungl. Sven. Vet. Akad. Handl. 54 (No. 7). 1916), depicts the Ross finds, among others, on a series of charts showing the polar distribution of each of these five species, with the exception of *S. groenlandica*. On the distribution chart of this species the Igloolik record established by Ross appears to have been inadvertently omitted.

calities are arranged in five groups lettered A to E. Within their respective groups the localities have been arranged, so far as possible, in order of latitude from south to north, without regard to longitude or date.

Localities at which crustacea were dredged, unless otherwise indicated, are as follows:

A. LABRADOR COAST. 1. Saglek Bay, September 25, 1925. 2. Kamak-torvik Bay, 59° 31' N., 63° 50' W., July 12, 1929. 3. Coast of Labrador, August and September, 1925.

B. FOX CHANNEL AND FOX BASIN, BAFFIN LAND, AND MELVILLE PENINSULA. 4. Four to five miles east of Cape Dorchester, August 8, 1927, 25 fathoms. 5. West end of White Island, Comer Straits, August 10, 1933. 6. Hurd Channel, between Bushman Island west of Vansittart Island and Melville Peninsula, August 10, 1933. 7. Between two unnamed islands south of Cape Martineau, east of Duckett's Cove, August 19, 1933, 7-15 fathoms. 8. Three stations in Duckett's Cove, Hurd Channel, August 11-13, 1933, 1-14 fathoms. 9. Cove, north shore of Lyon Inlet, August 24, 1933, shore collecting, low tide. 10. Four stations in Fox Basin between 66° 30' N.-66° 46' N. and 79° 15' W.-80° 07' W., August 10-13, 1927, 32-37 fathoms. 11. Bight, Cape Penrhyn, August 31, 1933, 11 fathoms. 12. Fox Basin, 67° 45' N., 79° 09' W., August 24, 1927. 13. Center Fox Basin, August 24, 1927, 25 fathoms. 14. Between Ooglit Islands and Eskimo village at Pingitkalik, September 5, 1933. 15. Two short dredge hauls in entrance to Straits of Fury and Hecla, September 3, 1933, 20-30 fathoms.

C. BAFFIN BAY, ELLESMERE LAND, AND WEST GREENLAND. 16. Three stations, southeast end of Cobourg Island, 75° 40' N., and between 78° 50' W. and 78° 56' W., August 3-4, 1935, 2½-18 fathoms, gravel-rocky bottom, surface temperature 38-39° F. 17. Two stations south end of Cobourg Island, 75° 40' N., 78° 58' W., August 4, 1935, 8-20 fathoms, very rocky bottom surface temperature 36° F. 18. Hudson Bay Company's Post, Ponds Inlet, Jones Sound, August 29, 1926, 10 fathoms. 19. Craig Harbour, Jones Sound, August 26, 1926, 7-20 fathoms. 20. Cape York, 76° 00' N., August 21, 1926 and August 28, 1932, 7-15 fathoms. 21. Kerkotak, Salvo Island, Melville Bay, August 28, 1932. 22. Parker Snow Bay, 76° 07' N., 68° 20' W., July 22, 1926 and July 24, 1935, 5-12 fathoms, muddy bottom. 23. Off Dalrymple Rock, Wolstenholm Sound, July 22, 1926. 24. Saunders Island, Wolstenholm Sound, July 22, 1926, 10-12 fathoms. 25. Two stations, Karnah, Inglefield Gulf, August 14, 15, 1926, 5-20 fathoms. 26. Four stations off Northumberland Island, Whale Sound, August 15-17, 26, 1926, 7-30 fathoms. 27. Two stations off Herbert Island, Whale Sound, July 25, 1926, 4-25 fathoms. 28. Hackluyt Island, Whale Sound, 77° 26' N., 72° 30' W., July 30, 1935, 11-20 fathoms, bottom small stones, surface temperature 37° F. 29. Three stations, Murchison Sound, August 19-21, 1926, 17-20 fathoms. 30. Five miles south of Cape Chalon, July 27, 1932. 31. Cape Alexander, Smith Sound, August 26, 1932.

D. EAST COAST OF GREENLAND. 32. Four stations, Angmagssalik, August 30, 1930, August 27-29, 1931, 20 fathoms. 33. Off Cape Stosch, Hudson Land, 74° 04' N., 17° 50' W., July 30, 1931, 120 fathoms. 34. Between Clavering Island and Hornes Foreland, July 31, 1930. 35. Clavering

Fiord, August 2, 1930. 36. Pendulum Island, July 20, 1930. 37. Bight Shannon Island, July 29, 1930.

E. BERING SEA AND ALASKA. 38. One and a half miles southeast of Cape Cheerful, Unalaska, August 4, 1924, from stomach of fish taken in 3 fathoms. 39. About 15 miles north of Big Diomedé Island, June 14, 1924. 40. Twenty-two miles off Shishmaref Inlet, June 27, 1924, 18 fathoms, ship stationary in ice. 41. Thirty miles off Devils Mountain, June 20, 1924, 16-18 fathoms, mud bottom. 42. Two stations, mouth of Kotzebue Sound, July 10, 1924, 10-17 fathoms, mud bottom, ship drifting in ice.

#### SPECIES COLLECTED

**Pandalus borealis** Krøyer. D and C. Taken twice by Captain Bartlett from the stomach of codfish at Angmagssalik, east Greenland, August 27, 1931, remains of two specimens; and at Laxebugt, Disko Island, 69° 19' 14" N., 54° 14' W., fragments of one specimen.

**Pandalus goniurus** Stimpson. E 39, 41, 42.

**Spirontocaris groenlandica** (J. C. Fabricius). B 7, 15. C 16, 17, 20, 23, 25, 26, 27, 29, 31. D 32. At Angmagssalik, east Greenland, this species was also found in the stomach of a cod, August 27, 1931.

The Biological Board of Canada had specimens obtained along the western shore of Hudson Bay, north of Churchill in 19 and 42 fathoms, off Mansel Island in 75 fathoms; in Hudson Strait at Nottingham Island and Sugluk Creek; and at Port Burwell, Ungava from cod stomachs.

**Spirontocaris polaris** (Sabine). A 2, 3. B 4, 5, 7, 8, 9, 10, 11, 13, 14. C 16-23, 25, 26, 27, 29, 30, 31. D 32, 33, 35, 36. Also found in cod stomachs, Angmagssalik, east Greenland, August 27, 1931. In one lot of specimens (B 7) there were no lateral spinules on the epimera of the fourth abdominal somite of one specimen, while another had a spinule on the left side only.

The Biological Board of Canada had received specimens from the southern part of Hudson Bay, 57° 19' N., 85° 32' W., from 52 to 54 fathoms; from Hudson Strait at Nottingham Island and Sugluk Creek; and from Wakeham Bay and Port Burwell, Ungava, both dredged and from cod stomachs.

**Spirontocaris microceros** Krøyer. A 1. Two specimens of good size were collected by Captain Bartlett from Saglek Bay, Labrador, September 1, 1925. The larger, 42 mm in length, had four rostral teeth, two on the carapace and two on the rostrum proper; the rostrum reached to the middle of the cornea and fell a little short of the first segment of the antennular peduncle. The smaller specimen, about 34 mm in length, was very typical of the species; its rostral teeth were five in number, two on the carapace and three on the rostrum proper; the rostrum was about as long as the eye, but a little short of the first segment of the antennular peduncle.

The Biological Board of Canada had a specimen of this species from a cod stomach from Port Burwell, Ungava, and two others determined as *S. zebra* Leim from the same source. Stephensen,<sup>3</sup> with Miss Rathbun,<sup>4</sup> believes that these two species are probably identical. In his paper Stephensen lists five localities on the southwest coast of Greenland where undoubted *S. microceros* has been obtained. Leim<sup>5</sup> records *S. zebra* from three localities in New Bruns-

<sup>3</sup> STEPHENSON, K. *Crustacea Decapoda, Godthaab Expedition*. Meddel. Grønland, 80 (No. 1): 81. 1935.

<sup>4</sup> RATHBUN, M. J. *Decapoda*. Canadian Atlantic Fauna, 10 m: 12. 1929.

<sup>5</sup> LEIM, A. H. *A new species of Spirontocaris with notes on other species from the Atlantic Coast*. Trans. Royal Canadian Inst. XIII (No. 4): 137. 1921.

wick and one in Nova Scotia, but makes no mention of *S. microceros*. Miss Rathbun contributes another locality for *S. microceros*: Misaine Bank, off Cape Breton Island, 45° 19' N., 58° 51' 15" W., 45 fathoms.

*Spirontocaris phippisii* (Krøyer) (= *Hippolyte turgida* Krøyer). A 2, B 5, 6, 13, 14, 15. C 20-31. D 32. In occasional specimens of *S. phippisii* the lower or smaller of the two supra-orbital spines may fail to develop.

This species has also been taken by the Biological Board of Canada at Nottingham Island in Hudson Strait; and at Wakeham Bay and Port Burwell, Ungava, at the latter place from cod stomachs.

*Spirontocaris spina* (Sowerby). A 2, 3. B 7, 10, 14, 15. C 17, 21, 23, 25, 26, 27, 29, 30, 31. D 32. E 42. Also found in stomach of cod, Angmagssalik, east Greenland, August 27, 1931.

The Biological Board of Canada has taken this species in Hudson Bay, just south of Mansel Island in 88 fathoms; in Hudson Strait at Sugluk Creek; and in Wakeham Bay and Port Burwell, Ungava; at the last named locality, however, only from cod stomachs.

*Spirontocaris fabricii* (Krøyer). A 2, 3. B 11, 14. C 22, 23, 24, 25. One large ovigerous female about 65 mm long out of a lot of five specimens from Parker Snow Bay (C 22) carries an adventitious supraorbital spine on the right orbital margin. This abnormality is of some interest, as the identity of the specimen is otherwise beyond question.

This species, like *Chionoecetes opilio*, mentioned below, is found in Arctic Alaska, the Bering Sea, and Siberia, as well as from Casco Bay, Maine, to west Greenland. Miss Rathbun<sup>6</sup> has already reported *S. fabricii* from Port Burwell, Ungava, and the east side of Hudson Bay, where the Biological Board of Canada secured a specimen in 1930 north of Churchill in 30 fathoms; additional specimens were obtained from Wakeham Bay and from cod stomachs from Port Burwell, Ungava.

*Spirontocaris gaimardii* (Milne Edwards). A 1, 2, 3. B 4, 6, 8, 10-15. C 16, 22, 25-28, 31. D 32, 34. E 39, 40, 42. Also found in cod stomachs at Angmagssalik, east Greenland, August 27, 1931.

The Biological Board of Canada has taken *S. gaimardii* at two stations along the southwestern shore of Hudson Bay in from 20 to 38 fathoms; and again from cod stomachs at Port Burwell, Ungava.

*Spirontocaris gaimardii belcheri* (Bell). A 2. B 7, 10, 13. C 20, 23, 25, 27, 29. D 32. Also found in cod stomachs at Angmagssalik, east Greenland, August 27, 1931.

Von Hofsten (*op. cit.*, p. 29) does not believe that the subspecies of *S. gaimardii* can be sustained as distinct entities, and gives his distribution records as for the species proper.

*Spirontocaris stoneyi* Rathbun. E 39. The single specimen that Captain Bartlett dredged north of Big Diomedé Island, Bering Strait, constitutes the third known record for the species. Originally described from the Bering Sea,<sup>7</sup> it has since been found at Shoal Tickle, southeast of Nain, Labrador.

*Crago dalli* (Rathbun). E 39.

*Sabinae septemcarinata* (Sabine). A 3. A single specimen was obtained from the stomach of a Ringed Seal secured off the Labrador coast in 1925. I cannot explain its absence from the dredge hauls made by Captain Bart-

<sup>6</sup> RATHBUN, M. J. *Decapod Crustaceans*. Canadian Arctic Expedition, 7 (Pt. A): 13A. 1919.

<sup>7</sup> RATHBUN, M. J. *Decapod Crustaceans*. Harriman Alaska Expedition, X: 103. 1904.

lett, for it was taken by the second Parry Expedition off Igloolik Island near the Straits of Fury and Hecla and occurs on both coasts of Greenland. It is a more or less circumpolar species.

In Hudson Bay it was taken by the Biological Board of Canada at nine stations in the southeastern central part of the Bay in depths ranging from 30 to 87 fathoms.

*Sclerocrangon boreas* (Phipps). B 6, 8, 10, 13. C 16, 18, 20, 22, 23, 25, 26, 27, 29, 30, 31. D 32, 33, 35, 37. E 39, 42.

Captain Bartlett found *Sclerocrangon boreas* in cod stomachs as well as in his dredgings from Angmagssalik, east Greenland, August 27, 1931.

This shrimp grows to good size and is one of the principal articles of food of the square-flipper seal, *Phoca barbata*. One to several dozen could be recognized from among the stomach contents of four different specimens of this seal. The two largest *Sclerocrangons* taken from these seal stomachs were  $4\frac{1}{2}$  and 5 inches long. One of these square-flipper seals was captured in the Straits of Fury and Hecla, another in Lyon Inlet, and two out in Fox Basin at approximately  $66^{\circ} 12' N.$ ,  $78^{\circ} 59' W.$  The depth of the water in this vicinity is 34 fathoms.

*Sclerocrangon boreas*, says von Hofsten (*op. cit.*, p. 80), is a panarctic form, also penetrating the boreal region in favorable localities. It prefers very cold waters and ground overgrown with algae. The matted, fibrous contents of the stomachs of two seals from Fox Basin, which contained numerous *S. boreas* substantiates this.

In Hudson Bay the Biological Board of Canada obtained this crustacean at four stations more or less in the same latitude across the middle of the Bay at depths ranging from 30 to 72 fathoms; specimens were also collected at Nottingham Island, Hudson Strait; and at Port Burwell, Ungava from a cod stomach.

*Sclerocrangon ferox* (Sars). D 33. A truly high arctic form, found only in waters of very low, usually negative, temperature and at depths of ninety fathoms or more. We find but a single specimen in Captain Bartlett's collection, from 120 fathoms, near Cape Stosch, Hudson Land, east Greenland,  $74^{\circ} 04' N.$ ,  $17^{\circ} 50' W.$ , July 30, 1931. This is the third specimen of the species ever to come to the National Museum and the first we have had from the western hemisphere.

*Argis lar* (Owen). E 39, 40, 41, 42. With this species Stephensen unites the next, *A. dentata* Rathbun. Though known from Greenland to Nova Scotia, and from the Bering Sea to British Columbia and east to Siberia, in Captain Bartlett's collection it is represented in hauls made only between Bering Strait and Kotzebue Sound in 1924.

*Argis dentata* (Rathbun). A 2. C 20, 22, 29, 31. D 32. Also found in cod stomach from Angmagssalik, east Greenland, August 27, 1931.

The Biological Board of Canada has specimens of this species from eight stations well scattered throughout Hudson Bay, with depths ranging from 30 to 80 fathoms; and both free swimming and from cod stomachs from Port Burwell, Ungava.

*Pagurus krøyeri* Stimpson. B 15. A single specimen taken off Igloolik Island at the entrance to the Straits of Fury and Hecla.

As European workers still merge this species with *P. pubescens* Krøyer, it is impossible to define the distribution of either species. In the National Museum there is an extensive series of *P. krøyeri* from along the east coast of America as far south as Virginia,  $37^{\circ} 19' 45'' N.$ ,  $74^{\circ} 26' 06'' W.$ , from 120 fathoms; several Labrador localities are represented: off Narak, Nain, Port

Manvers, Cape Mugford, and Hebron, 7-60 fathoms; and Greenland: Godhavn Harbor, Disko Island, and Hare Island, 70° 20' N., 56° W., 90 fathoms. Further, there are specimens from the Firth of Clyde, 10-15 fathoms, and from Varanger Fiord, East Finmark. For the specimens of true *P. pubescens* in the collection of the Museum, the southern limit is off Cape Hatteras, 35° 42' 00" N., 74° 54' 30" W., 43 fathoms, while the northern limit is Egg Harbor, Labrador, 7 fathoms.

The Biological Board of Canada got a specimen from each of two Hudson Bay stations on the west side of the Bay north of Churchill, in depths of 30 and 63 fathoms; and another specimen from a cod capture at Port Burwell, Ungava.

*Pagurus trigonocheirus* Stimpson. E 39, 40, 41, 42.

*Pagurus capillatus* (Benedict). E 42.

*Pagurus splendescens* Owen. E 39, 40, 41, 42.

*Pinnixa occidentalis* Rathbun. E 38. A single specimen from about the northern limit for this species, from the stomach of a fish caught 1½ miles S.E. of Cape Cheerful, Unalaska.

*Chionoecetes opilio* (O. Fabricius). E 40, 41. In its distribution, *C. opilio* is like *Spirontocaris fabricii*, occurring in the Pacific boreal and arctic regions, as well as on the northeast coast of America and west Greenland, but not in east Greenland. Unlike *S. fabricii*, its presence in Fox Basin cannot be established. Captain Bartlett's three specimens of this species are from the arctic coast of Alaska.

*Hyas araneus* (Linn.). A 3.

*Hyas coarctatus alutaceus* Brandt. A 3. C. E 39, 40, 41, 42. Captain Bartlett got one specimen of this species along the Labrador coast in 1925; fragments of 10 small individuals from a cod caught at Laxebugt, Disko Island, Greenland, in 1935; and 10 at four localities in the Bering Sea and Alaska in 1924.

The Biological Board of Canada obtained this crab in James Bay; at Fort Churchill and Churchill River; and at six dredge stations in the eastern and northwestern parts of Hudson Bay from depths of 19 to 82 fathoms; in Hudson Strait from Charles Island, Nottingham Island, Sugluk Creek, and Eric Cove; and at Cape Wolstenholme, Wakeham Bay, and Port Burwell, Ungava.

CRUSTACEA IDENTIFIED FROM THE STOMACH CONTENTS OF  
WHALES, SEALS, AND FISH

Sperm whale. Decapoda: *Chionoecetes opilio* (O. Fabricius).

Finback whale. Euphausiacea: *Thysanoessa inermis* (Krøyer), *T. raschii* (M. Sars).

Sulphur-bottom whale. Euphausiacea: *Thysanoessa raschii* (M. Sars).

Amphipoda: *Themisto compressa* forma *bispinosa* Boeck.

Ringed or Floe-rat seal. Decapoda: *Sabinea septemcarinata* (Sabine).

Euphausiacea: *Thysanoessa inermis* (Krøyer), *T. raschii* (M. Sars). Mysidacea: *Mysis oculata* (O. Fabricius). Amphipoda: *Themisto libellula* (Mandt), *Gammarus locusta* (L.).

Bearded or Square-flipper seal. Decapoda: *Sclerocrangon boreas* (Phipps). Isopoda: *Arcturus baffini* (Sabine).

Harp seal. Euphausiacea: *Thysanoessa inermis* (Krøyer). Amphipoda: *Themisto libellula* (Mandt).

Unidentified seal. Decapoda: *Spirontocaris gaimardii belcheri* (Bell). Mysidacea: *Mysis oculata* (O. Fabricius).

Codfish. Decapoda: *Pandalus borealis* Krøyer, *Spirontocaris groenlandica* (J. C. Fabricius), *S. polaris* (Sabine), *S. spina* (Sowerby), *S. gaimardii* (Milne Edwards), *S. gaimardii belcheri* (Bell), *Sclerocrangon boreas* (Phipps), *Argis dentata* (Rathbun), *Hyas coarctatus alutaceus* Brandt. Amphipoda: *Themisto libellula* (Mandt), *Anonyx nugax* (Phipps), *Pseudolibrotos nanseni* Sars, *Gammarus locusta* (L.), *Gammaracanthus loricatus* (Sabine).

Unidentified fish. Decapoda: *Pinnixa occidentalis* Rathbun.

ZOOLOGY.—*The histology of nemic esophagi. VI. The esophagus of members of the Chromadorida.*<sup>1</sup> B. G. CHITWOOD, Bureau of Animal Industry, and M. B. CHITWOOD.

This paper is the sixth of a series (Chitwood and Chitwood, 1934–1936) dealing with the structure of esophagi in representatives of various groups of nematodes. Previous papers in the series have covered representatives of the Rhabdiasidae, Strongylidae, Metastrongylidae, Heterakidae, Rhabditidae and Anguilluliniidae. The present paper covers representatives of the order Chromadorida, namely: Plectidae, Camacolaimidae, Axonolaimidae, Comesomatiidae, Cyatholaimidae, Tripyloididae, Desmodoridae, Chromadoridae, Monhysteridae, Linhomoeidae, and Siphonolaimidae. In representatives of the Chromadorida as in the other aphasmidian order, Enoplida, absolute identifications of nerve cell, radial and marginal nuclei are often not possible, as there is too little distinction between the characters of these 3 types of nuclei, and the cell bodies of “nerve cells” are seldom observable. However, the distribution of nuclei is sufficiently similar in the various genera for homologies to be ascertained. In the following text, the authors have identified nuclear types to the best of their abilities. In some instances it has been possible to determine cytologically the identity of a given nucleus, while in other cases the position indicated that the nucleus in question was homologous to one definitely identified in another form although they might differ cytologically in some respects. Future papers will include representatives of the orders Enoplida (Enoplata, Dorylaimata, and Diocetophymata) and Spirurida (Camallanata and Spirurata).

The data given in this paper are, for the most part, presented in tabular form (Figs. 3, 5, 10) and in illustrations, since the essay form of presentation would result in extended descriptions requiring much more space than the present form. The text calls attention to the major features given in the tables and illustrations, and presents some data not immediately obvious in the latter. Previous papers in

<sup>1</sup> Received June 22, 1936.